

**UNITED STATES DEPARTMENT OF COMMERCE
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SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/471,890 06/07/95 HUFFMAN

D 7913ZY

EXAMINER

DI MAURO, P

11M1/0603

ART UNIT

PAPER NUMBER

LEOPOLD PRESSER
SCULLY SCOTT MURPHY & PRESSER
400 GARDEN CITY PLAZA
GARDEN CITY NY 11530

1103

DATE MAILED:

06/03/96

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 6/7/95 *prelim. Amendment* ☐ This action is made final.

A shortened statutory period for response to this action is set to expire Three (3) month(s), -0- days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- | | |
|---|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited by Examiner, PTO-892. | 2. <input type="checkbox"/> Notice of Draftsman's Patent Drawing Review, PTO-948. |
| 3. <input type="checkbox"/> Notice of Art Cited by Applicant, PTO-1449. | 4. <input type="checkbox"/> Notice of Informal Patent Application, PTO-152. |
| 5. <input type="checkbox"/> Information on How to Effect Drawing Changes, PTO-1474. | 6. <input type="checkbox"/> |

Part II SUMMARY OF ACTION

1. ☒ Claims 45-88 are pending in the application.

Of the above, claims _____ are withdrawn from consideration.

2. ☐ Claims _____ have been cancelled.

3. ☐ Claims _____ are allowed.

4. ☒ Claims 45-88 are rejected.

5. ☐ Claims _____ are objected to.

6. ☐ Claims _____ are subject to restriction or election requirement.

7. ☒ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. ☐ Formal drawings are required in response to this Office action.

9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).

10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).

11. ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).

12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.

13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. ☐ Other

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A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 46-69, 71-78 and 82-88 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 76, 82-90, 92-103, 111-114, 119, 122-123, 137, 165-170 and 173 of copending application Serial No. 07/580,246. This is a *provisional* double patenting rejection since the conflicting claims have not in fact been patented.

- Note that the rejected claims are identical respectively to those claims numbers in copending '246, which application has an identical invention entity.

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The non-statutory double patenting rejection, whether of the obvious-type or non-obvious-type, is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent. *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Van Ornam*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); and *In re Goodman*, 29 USPQ2d 2010 (Fed. Cir. 1993).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321 (b) and (c) may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.78 (d).

Effective January 1, 1994, a registered attorney or agent of record may sign a Terminal Disclaimer. A Terminal Disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 45, 70, and 79-81 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 45-75, 77, 79--81, 91, 104-110, 115-118, 120-121, 124-136, 138-164, 171-172 and 174-180 of copending application Serial No. 07/580,246. Although the conflicting claims are not identical, they are not patentably distinct from each other because the product of the claims of copending '246 differ only in that they are described by a slightly different method of making.

This is a *provisional* obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

However, any differences imparted to the instant product-by-

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process claims by their method of making, vis-vis the product claims of copending application '246, would have been obvious ones to the person having ordinary skill in the art, because where the examiner has found a substantially similar product as in the copending claims, the burden of proof is shifted to applicant to establish that their product is patentably distinct, not the examiner to show the same process of making; C.F. In re Brown, 173 USPQ 685 and In re Fessmann, 180 USPQ 324.

Claims 45-47, 70, 75, 77, 79-81 are rejected under 35 U.S.C. § 112, first paragraph, as the disclosure is enabling only for claims limited to the "carbon source" being the elemental carbon disclosed in the specification, such as graphite or amorphous carbon or glassy carbon. See M.P.E.P. §§ 706.03(n) and 706.03(z).

The rejected claims vaporize any "carbon source", which on its face can be any carbon source, even those already gaseous ones like dimethyl ether or methane, for example.

However, the specification and claims as originally filed, do not provide an enabling disclosure for producing C₆₀ and C₇₀ molecules from vaporizing anything other than elemental carbon. Please note page 3, lines 26-31 of the original specification, which recites "vaporizing carbon from any source containing

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carbon in its various forms, e.g., graphite, amorphous and glassy carbon". The "carbon vapor" so formed gets quenched and nucleated. It is clear that this vapor is essentially nothing but carbon atoms. If the "source" of carbon were not elemental carbon then the question would arise and persist as to what brings about the conversion of, say dimethyl ether into a carbon vapor composed essentially of carbon. Since the specification does not enable any kind of conversion of a non-elemental carbon source (that is a combined carbon form) into "carbon vapor", then the specification is only enabled for the carbon source being the elemental carbon described therein.

The following is a quotation of the first paragraph of 35 U.S.C. § 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. § 112, first paragraph, as the specification, as originally filed, does not provide support for the invention as is now claimed.

Present claims 53, 62, and 68-88 recite that "macroscopic" quantities of a material are formed, or are being claimed, which

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quoted word is deemed to be unsupported. Applicants rely on various portions of the disclosure in alleging support exists. Specifically, Applicants refer to the disclosure of "recoverable amounts", the x-ray diffraction of "crystals," the IR spectrum obtained from a 2 micron thick coating, and the fact that a specific color was observed. However, none of these disclosures require the presence of "macroscopic quantities." Microscopic quantities or less can be recovered, crystals are very often microscopic as opposed to macroscopic, x-ray and I data can be obtain from less than macroscopic quantities, and color can be observed under a microscope. As to the 2 micron thick coating, there is no indication of record that such a small coating, i.e. 2 ten-thousandths of a centimeter, can in fact be seen.

Moreover, insertion of "macroscopic amounts" into the claims is not supported because the new phrase represents a broadening of the scope of the original disclosure. To illustrate, the literal language of the original disclosure supports the production of fullerene in quantities sufficient to produce coatings that are 2 microns thick. However, the new term "macroscopic amounts" extends the disclosure of the amount of fullerenes produced from this minimal amount to amounts far in excess, e.g. one ton of fullerenes. There is no disclosure

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supporting or describing larger quantities of fullerenes as embraced by the term "macroscopic amounts." Applicants have not specifically pointed out where support exists for the production of macroscopic quantities of C_{70} . The specification states that the product is only 2% C_{70} . If support for the production of macroscopic quantities of fullerenes in general is tenuous, then the question of whether macroscopic quantities of C_{70} is supported by the disclosure of only 2% C_{70} is more in doubt. In addition, it is not clear what is present after applicants actually separate C_{60} from C_{70} . In the instant specification, C_{70} is detected by mass spectroscopy, but it is not necessarily "substantially pure" or in "macroscopic amounts".

The facts of the instant case are controlled by those of In re Barker, 194 USPQ 470 (CCPA 1977). In this case, the original disclosure contained drawings that showed contemplation of an embodiment of making prefabricated panels of wooden shingles where the backing board had lengths of four or eight feet with a repetitive series of eight or sixteen shingle per backing board. Id. at 471, 474. This disclosure was held not to support or describe an amendment requiring the backing board to have a length at least as great as the aggregate width "of at least six

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shingles." Id. at 474. Accordingly, the court did not allow extension of the disclosure from a backing board long enough to hold eight or sixteen shingles to a backing board long enough to hold "at least six shingles".

Claims 53, 62 and 68-88 are rejected under 35 U.S.C. § 112, first paragraph, for the reasons set forth in the objection to the specification.

Claims 47, 63-67, 76-78, 81 and 88 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 47, line 2, there is no antecedent for "step (F)".

In claims 76 and 77, it is unclear what is the significance of the trailing degree sign.

In claim 64, line 2, the word "capable" is apparently misspelled.

In claims 63-67, 78, 81 and 88, the recitation of "amounts capable of ...", being detected by various analytical instruments is indefinite. The lower limit of the quantities recited in the instant claims is unclear as detection limits of the recited instruments are subject to change, and may vary from instrument to instrument. For example, the Examiner takes official Notice

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that the detection limits of a single beam \mathbb{R} vary significantly from that of a Fourier Transform \mathbb{R} . The claims do not specify which type of instrument serves as the standard. Further, the detection limits of any instrument vary with the type of sampling method used. Again, the instant claims are silent as to which sampling methods have been used to define the lower limits of the claim. Accordingly, the claims are indefinite as one of ordinary skill in the art would be unable to determine the metes and bounds of the claims with the information provided.

35 U.S.C. § 101 reads as follows:

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title".

Claims 45-88 are render 35 U.S.C. § 101 because the invention as claimed embraces products found in nature as shown by the Buseck, et al., article.

As set forth by the Commissioner of Patents and Trademarks, Official Gazette, 1077 O.G. 24 (1987):

"Products found in nature will not be considered to be patentable subject matter under 35 USC 101 and/or 102. An article of manufacture or composition of matter occurring in nature will not be considered patentable unless given a new form, quality,

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properties or combination not present in the originally article existing in nature in accordance with existing law. See e.g. Funk Bros Seed Co. v. Kalo Inoculant Co., 333 127, 76 280 (1948); American Fruit Growers v. Brogdex, 283 U.S. 1, 8 USPQ 131 (1931): Ex parte Grayson, (Bd. App. 1941)".

The article by Buseck et al. in Volume 257 of the July 1992 Science magazine is considered to be evidence that fullerenes, in the form of C_{60} and C_{70} , are naturally occurring forms of carbon found in nature in the strata of certain Precambrian rocks(shungite) and Cretaceous period clays. Applicants' claims do not exclude or distinguish from the naturally occurring fullerenes. Specifically, there is no evidence in the record which establishes that Applicants' C_{60} and C_{70} differs in form, quality or properties from naturally occurring C_{60} and C_{70} .

It is noted that certain of Applicants' claims are drafted in the so-called "product-by-process" format. However, it is by now well-settled that claims drafted in such a format are claims to the product not the process of preparing the product. In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). Thus, absent any evidence that the product of Applicants' process is different from naturally occurring C_{60} and C_{70} , these claims are likewise seen as claims which do not distinguish from the

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naturally occurring products and are, thus, also considered to be directed to unpatentable subject matter under 35 USC 101.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

Claim 48 is rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 as obvious over Tominaga (US 3,931,704).

Tominaga teaches that diamond particles exist and/or can be made in any of a large number of desired colors, ranging over the entire spectrum, such as pink or brown (col. 4, lines 47-55). The means to achieve the desired color can be by exposure of diamond to radioactive rays. Please note that diamond is a carbon allotrope.

Therefore, it is within the prior art, or alternatively, obvious to the person of ordinary skill in the art to prepare a "brownish red carbon allotrope" by means of irradiating diamond particles, in order to achieve the required color.

Claims 45-51, 53-56, 58-59, 62-88 (absent the new matter) are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 as obvious over the Kroto article in Nature (vol. 318, pg. 162, Nov. 14, 1985), with the

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Curl article in Scientific American (October 1991, page 54) cited to show an inherent state of fact.

This rejection^{is} applied to claims 53, 62 and 68-88 absent the new matter "macroscopic amounts", in those claims.

As discussed in the Nature article, Kroto et al. detected C₆₀ and C₇₀ fullerenes in soot produced by the laser evaporation of graphite. The C₆₀ and C₇₀ were detected or measured by means of time of flight mass spectrometry, and the amount of C₆₀ and C₇₀ molecules produced was on the order of tens of thousands (see the Curl et al. article in scientific American, October 1991, pg. 54, third column). The Examiner notes that the detection method used by Kroto et al. detected the C₆₀ and C₇₀ in the vapor state, thereby anticipating the instant claims.

Instant claims 45-47, 50, 70-77, 79-88 require that the C₆₀ or C₇₀ be incorporated into a solid matrix. The disclosure of Kroto et al. inherently meets this requirement as solid particulate of free flowing soot is "formed" in the evaporation chamber. Given the well known stability of the fullerenes produced it is inherent that the fullerenes not directed to the mass spectrometer are inherently incorporated into the soot mixture, which is either amorphous or crystalline. Thus, the instant claims are anticipated in this respect. Also, the

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limitation that the product be formed and extended in at least one directed is noted. This is not seen to distinguish the instant product because the limitation reads on any particle that has a definite size.

Note that immediately after the graphite is vaporized, the helium atmosphere in the apparatus of Kroto et al. contains a carbon product that comprises a mixture of C_{60} and C_{70} . Regarding the instant claims that define the properties of C_{60} and C_{70} fullerenes such as the infrared spectra, UV spectra, solubilities, and color, the Examiner notes that these are all inherent properties of the C_{60} and C_{70} molecules produced and detected by Kroto et al. which have subsequently been confirmed in the art. Regarding the instant limitations in claims 51-and 56 that the fullerenes be "substantially pure", as shown in Fig. 3 of the reference, detection peaks for C_{60} and C_{70} are fully separated from other peaks thus indicating that the instrument has isolated the C_{60} and C_{70} from other substance in the matrix thus indicating that the two are "pure" or "substantially pure".

As to the instant product by process claims, for the reasons discussed above the C_{60} and C_{70} products of Kroto et al. are identical or only slightly different from that claimed. Thus, the instant product by process claims are rendered prima prima

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facie obvious by the teaching of Kroto et al. See MPEP 706.03(e).

Claims 45-51, 53-56, 58-59 and 62-88 are rejected under 35 U.S.C. § 102(b) as being anticipated by the Kratschmer article entitled "spectroscopy of Matrix-Isolated carbon cluster Molecules".

The Kratschmer article teaches a process of vaporizing graphite rods in an evacuated reactor under a slight pressure of He gas (pages 815-816). Note that a comparison of Figure 2 of the reference, with instant figure 4, shows that the fullerenes inherently produced by the process were detected by UV (ultraviolet). Because Kratschmer performs the same process steps as do applicants in their claimed process, e.g. as in claim 75, then inherently the same product is formed in the same amounts.

Claims 45, 48-50, 53-55, 62-67, 70-78, 84-85 and 88 are rejected under 35 U.S.C. § 102(a) as being anticipated by the article by Kratschmer, Huffman and Fostiropoulos of July 1990 in Chem Phys. Lett.

The subject article applies at this time as prior art under 35 USC 102(a) because the three names on the article make it formally the writing of "another" entity. Please note MPEP

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2132.01 and references therein to Ex parte Kroger (219 USPQ 370, Board Pat. App. and Int., 1982).

The subject article prepares and isolates carbon smoke particles by evaporating graphite rods under 100 torr quench pressure of helium gas. The particles are collected on substrates, and infrared and UV spectra are obtained which give peaks which are the same as those reported in the instant application. See page 167, col. 2 through page 169, col. 2.

Since the subject article appears to identically disclose applicants' preferred method of isolating/preparing C₆₀-rich carbon soot, it is deemed to anticipated the instantly rejected claims.

Applicant's arguments with respect to claim 45-88 have been considered but are deemed to be moot in view of the new grounds of rejection.

Claims 45-88 of this application conflict with claim 45-77 and 79-180 of application serial number 07/580,246. 37 C.F.R. § 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during

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pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See M.P.E.P. § 822.

Applicants are kindly requested to explain how any amendment to the instant claims would lead the examiner to not join this application with the interference involving 07/580,246.

Any inquiry concerning this communication should be directed to P. DiMauro at telephone number (703) 308-0680.



P. DiMauro:rg
May 22, 1996



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